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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/758,325	01/10/2001	Song Hak Kim	GK0001M	9119

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EXAMINER

STREGE, JOHN B

ART UNIT	PAPER NUMBER
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2625

DATE MAILED: 02/25/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary

Application No.

09/758,325

Applicant(s)

KIM ET AL.

Examiner

John B Strege

Art Unit

2625

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 January 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-5 and 10-17 is/are allowed.
- 6) ☒ Claim(s) 6-9 and 18-33 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 January 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☒ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Applicant's election with traverse of Group III in Paper No. 4 is acknowledged. Examiner has reconsidered the situation and the restriction requirement is now withdrawn. As a result, all claims 1-33 have been examined.

Examiners Comment

The drawings as submitted are not formal as they contain handwritten additions on several pages (figure 1 as an example). The examiner suggests submittal of formal drawings.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 6-9, and 28-33 are rejected under 35 U.S.C. 102(b) as being anticipated by the applicants admitted prior art.

Claim 28 discloses, A method of detecting an orientation of a die comprising: setting a first die eye box and a first die eye point on a specific pattern of the die; capturing a first picture inside of the first die eye box; and comparing the first picture to a control picture stored in a memory."

Applicant labels Figures 10A, 10B, 11, 12, 13a-13e, and 14 as prior art. The applicant discloses "a die orientation step 1210" where a first die eye box and die eye

point are set on the edge of the die that contains two or more bond pads. A "picture is captured" and the captured picture is "compared with a...control picture stored in a memory" (page 6 lines 18-35). Since figures 13D and 13E are prior art then 32 is disclosed as a specific pattern which meets verbatim the limitation of the claim. Additionally, the bond pads disclosed within the die eye box can be considered to be a specific pattern. A pattern is defined in Websters dictionary as a meaningful regularity that can be used to classify objects or other regions of interest. The bond pads are regularly spaced (as supported by page 7 lines 23-25 and figure 14) and therefore can be considered to form a "specific pattern".

Regarding claims 29-30, page 6 lines 26-31 of the description of the related art disclose "if the captured is identical with the ... control picture, the next step is progressed." If the picture is within "the permitted range, the camera is moved in the axes of X and Y to make the captured picture be completely identical with the...control picture."

Regarding claim 31, a die bond is square in shape, thus the layout of the die bonds can be considered to be a figure (also the feature labeled as 32 in 13D shows a figure, character, and number).

Regarding claims 32, paragraph 23 discloses if the picture is different form the control picture, "further steps are stopped". This is a determination that the die is mounted in error.

Regarding claim 33, the die bonds are adjacent to the edges as seen in figure 14 (also the feature labeled as 32 is adjacent to the edges).

Claim 6 discloses, "A method for recognizing patterns, the method comprising: a lead frame orientation detecting step of sensing a hole number of a lead frame seated on a heater block and determining whether or not the lead frame is seated in an exact first position; a first lead frame indexing step of setting a lead eye box and a lead eye point on one tie bar of the lead frame with a camera before clamping the lead frame with a clamp, and determining whether or not the lead frame is seated in the exact first position; a second lead frame indexing step of setting lead eye boxes and lead eye points on two tie bars of the lead frame with the camera after clamping the lead frame with the clamp, and redetermining whether or not the lead frame is seated in the exact first position; a Video Lead Locate step of capturing positions of leads of the lead frame with the camera and memorizing the positions; and a die orientation detecting step of setting die eye boxes and die eye points on specific patterns adjacent edges of a die with the camera and determining whether or not the die is mounted in an exact second position."

Applicant discloses as related art the lead frame orientation detecting step (page 4 lines 1-10), a first lead frame indexing step (page 4 lines 1-10), a second lead frame indexing step (page 5 lines 15-36, and page 6 lines 1-7, amended specification was consulted where appropriate), and a video lead locator step (page 6 lines 15-17). Furthermore Applicant labels Figures 10A, 10B, 11, 12, 13a-13e, and 14 as prior art. The applicant discloses "a die orientation step 1210" where a first die eye box and die eye point are set on the edge of the die that contains two or more bond pads. A "picture is captured" and the captured picture is "compared with a...control picture stored in a

memory" (page 6 lines 18-35). Since figures 13D and 13E are prior art then 32 is disclosed as a specific pattern which meets verbatim the limitation of the claim.

Additionally, the bond pads disclosed within the die eye box can be considered to be a specific pattern. A pattern is defined in Websters dictionary as a meaningful regularity that can be used to classify objects or other regions of interest. The bond pads are regularly spaced (as supported by page 7 lines 23-25 and figure 14) and therefore can be considered to form a "specific pattern".

Regarding claims 7-8 the item labeled 32 is disclosed as prior art in figure 13D and 13E which is a figure, and therefore meets the limitations of the claim.

Regarding claim 9, this is explicitly disclosed as the applicants admitted prior art on page 6 lines 8-14.

3. Claim 18, and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Ito USPN 5,406,700.

Ito discloses a method of producing an integrated circuit lead frame and a method of mounting a chip onto the lead frame (col. 1 lines 13-17). Ito further discloses a pair of inner leads 3 and 3m (figure 1) that are made to have Z-shaped step portions (unsymmetrical part of the substrate). As seen in Fig. 2 labeled 20a a lead eye box is set on an unsymmetrical portion, and a corner point is found 21a (lead eye point). The window is "recognized as an image" (col. 4 lines 43-45). This image is "compared with a reference image and reference position information stored in an image recognition apparatus" (col. 4 lines 45-47).

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Regarding claim 20 Ito discloses that the comparison is made in order to compute displacement quantities, and "bonding position correction is performed" to move the leads so that a good result, or proper bonding can be obtained" (col. 4 lines 45-53). This good result would mean making the position identical to the reference.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 19 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ito USPN 5,406,700.

As discussed above Ito discloses all of the limitations of claim 18 of which claim 19 depends. Claim 19 further discloses "the first picture is completely identical to the control picture." Ito does not explicitly disclose this since it uses the difference in the images to properly bond the leads in the correct position. It is not an inventive step to have the picture completely identical to the control picture. It is possible that the invention disclosed by Ito could be in the proper position when the image is taken which would mean that no further corrective action is needed to place the lead in the proper bonding position. Since this is something that could naturally occur it would be an

obvious part of the invention of Ito to account for the situation where the photographs are identical.

Regarding claim 27, the inner lead disclosed by Ito is part of a lead frame (as seen in figure 1).

6. Claims 21 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ito USPN 5,406,700 in view of the applicants admitted prior art.

As discussed above Ito discloses all of the limitations of claim 18 of which claim 21 depends. Claim 21 further discloses, "the method as claimed in claim 18 wherein the setting is performed with a camera and wherein the comparing comprises determining a difference between the first picture and the control picture, the method further comprising moving the camera to make the first picture be completely identical with the control picture."

Ito does not explicitly disclose using a camera, although an image is captured and it is well known in the art to use a camera to capture an image. Ito does not disclose moving the camera to make the picture identical with the control picture.

On page 6 lines 18-35 of the applicant admitted prior art the process of moving a camera to make an image equivalent to a control image if the image is within a specified range is disclosed.

Ito and the applicants admitted prior art are analogous because they are from the same field of endeavor of wire bonding processes of a lead frame.

At the time of the invention it would have been obvious to one of ordinary skill in the art to combine Ito with the applicant's admitted prior art in order to obtain an

invention that accounts for camera misalignment by aligning the camera to the window. The motivation for doing so would be to allow for slight problems that result from camera alignment and do not relate to the position of the substrate to be resolved before moving the substrate. Therefore it would have been obvious at the time of the invention to one of ordinary skill in the art to combine Ito with the applicant's admitted prior art in order to obtain the invention specified in claim 23.

Claim 26 discloses, "the method as claimed in claim 18 wherein the first lead eye box and the first lead eye point are set on the unsymmetrical part of the substrate through an observation hole of a clamp." Although Ito discloses setting the lead eye box and lead eye point on an unsymmetrical part of the substrate, it is not explicitly disclosed that this is through an observation hole of a clamp.

The applicant's admitted prior art discloses a clamp 1100 with a window 1140 (figure 11) and discloses that a lead eye box is set inside the window. Furthermore it can be seen in figure 13a that the inner lead are visible through the window.

Ito and the applicant's admitted prior art are analogous art because they are from the same field of endeavor of wire bonding processes of a lead frame.

At the time of the invention it would have been obvious to combine Ito with the admitted prior art of the applicant in order to obtain a device to produce a lead frame according to Ito, that also accounts for the use of a clamp to hold the frame down as is taught by the applicant's admitted prior art. The motivation for doing this would be to allow the invention of Ito to work also with a clamp if necessary. Therefore it would have been obvious at the time of the invention to one of ordinary skill in the art to combine Ito

and the applicant's admitted prior art in order to obtain the invention as specified in claim 26.

7. Claims 18, 22, 28-29, and 31-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moon USPN 5,796,161 in view of Ito USPN 5,406,700.

Claim 28 discloses, "a method of detecting an orientation of a die comprising: setting a first die eye box and a first die eye point on a specific pattern of the die; capturing a first picture inside of the first die eye box; and comparing the first picture to a control picture stored in a memory."

Moon discloses a method of aligning a lead frame strip in a wire bonding process (col. 1 lines 5-12). Further disclosed are multiple die sensing regions (17 and 18 of figure 5a and 6) that expose corner portions of the die (col. 4 lines 47-49). Here the die eye point could be considered to be the line of view of the camera. The alignment condition of the lead frame strip is sensed (col. 4 lines 41-42) and the sensing means are "picture identifying cameras set on the wire bonding equipment" (col. 4 lines 50-51), therefore there must be a picture (specific pattern) on the die used for alignment purposes. Also there are die bonds on a die that would form a meaningful pattern. The picture is captured and used to confirm the alignment condition of the die (as shown in step 105 of figure 7). Moon does not go into detail on how alignment is confirmed, therefore does not explicitly disclose if comparing the image to a control picture is included in this step.

Comparing an image to a reference image for the purpose of alignment is well known in the art of alignment. Ito discloses taking an image and comparing that image with a reference image (col. 4 lines 45-47). This is done in order to mount a die onto a lead frame (col. 1 lines 13-17).

Moon and Ito are analogous art because they are from the same field of endeavor of using a wire bonding process to mount a die onto a lead frame.

At the time of the invention it would have been obvious to use the process of comparing the image taken by Moon to a reference image in order to confirm the alignment condition of the die and lead frame. The motivation for using the method as disclosed by Ito is that it is a well known method of aligning an object therefore it would be obvious to use it. Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Moon and Ito in order to obtain the invention as specified in claim 28.

Regarding claim 29, it would be obvious that if the chip is properly aligned that the first picture would be identical to the control picture.

Regarding claim 31, as stated above Moon the pattern used by Moon is a picture.

Regarding claim 32, the combination as discussed would be used to "confirm the alignment condition of the die and frame" (105 fig. 7).

Regarding claim 33, as stated the die sensing regions (17 and 18) expose edge portions of the die containing the picture, thus the pattern is adjacent an edge of the die.

Regarding claim 18, Moon discloses setting "a lead sensing region 19 (figure 5a) exposed through the lead sensing window 12B that is a portion including one gate hole 5 adjacent the lead frame and a part of the side rails on the periphery of the gate hole 5" (col. 4 lines 44-47). This region as seen through 12B can be seen to be unsymmetrical. A camera is used to capture the image (col.5 line 30) and this is used to confirm the alignment condition of the lead frame. Once again Moon does not explicitly disclose comparing the image to a control picture stored in memory. However, as stated, Ito does and the references can be combined in the same manner as discussed above.

Regarding claim 22, as stated the window used by Moon in the lead sensing region comprises a gate.

8. Claims 23-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moon USPN 5,796,161 in view of Ito USPN 5,406,700 further in view of Roberts et al. USPN 6,577,019 (hereinafter Roberts).

Regarding claims 23-25 the combination of Moon and Ito does not explicitly disclose that the gate that is imaged through the window comprises the dent part of the gate, a plated layer on the gate, or a support bar.

Roberts discloses a problem associated with prior wire bonding processes that "utilize lead frames that provide an insufficient indication of the orientation of the lead frame. In particular it is possible for the lead frame to be mistakenly oriented within the wire bonding system in a rotated manner such that the lead frame is rotated by 180 degrees" (col. 3 lines 10-16). In order to resolve this problem Roberts discloses using

eyepoint features arranged in an asymmetrical manner used to properly orient the lead frame (col. 7 lines 1-2).

Moon, Ito, and Roberts are all analogous art because they are all from the same field of endeavor of using wire bonding to mount a die on a lead frame.

At the time of the invention it would have been obvious to one of ordinary skill in the art to combine Moon and Ito in the manner described above, and to further combine the teachings of Roberts in order to obtain a lead sensing window set on an unsymmetrical part of the lead frame in order to insure proper orientation. Any unsymmetrical object would make the system feasible including a plated layer, a dent part or a support bar and the selection of one of the following would be a design choice. The motivation for doing so would be to solve the problem as stated by Roberts where the lead frame is erroneously oriented. Therefore it would have been obvious to one of ordinary skill in the art to combine Moon, Ito, and Roberts in order to obtain the inventions as specified in claims 23-25.

9. Claim 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moon USPN 5,796,161 in view of Ito USPN 5,406,700 and further in view of the applicants admitted prior art.

Regarding claim 30, Moon does not disclose moving the camera to make the picture identical with the control picture.

On page 6 lines 18-35 of the applicant admitted prior art the process of moving a camera to make an image equivalent to a control image if the image is within a specified range is disclosed.

Moon, Ito, and the applicants admitted prior art are analogous because they are all from the same field of endeavor of wire bonding processes of a lead frame.

At the time of the invention it would have been obvious to one of ordinary skill in the art to combine Moon and Ito in the manner stated above, and further combine them with the applicant's admitted prior art in order to obtain an invention that accounts for camera misalignment by aligning the camera to the window. The motivation for doing so would be to allow for slight problems that result from camera alignment and do not relate to the position of the substrate to be resolved before moving the substrate. Therefore it would have been obvious at the time of the invention to one of ordinary skill in the art to combine Ito with the applicant's admitted prior art in order to obtain the invention specified in claim 30.

Allowable Subject Matter

10. Claims 1-5,10-17 are allowed.

The following is an examiner's statement of reasons for allowance: None of the prior art teach, or fairly suggest, in a method for recognizing patterns, among other things a lead frame orientation detecting step and a lead frame indexing step wherein a second lead eye box is set on a support bar on an outer circumference of the clamp before and after clamping that is used to capture the leads and properly orient the lead frame. In Moons method, which is the closest prior art only one lead eye box is used to image a gate through a clamp. Moon fails to use a second lead eye box to capture an image of a support bar outside of the clamp to correct the orientation.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John B Strege whose telephone number is (703) 305-8679. The examiner can normally be reached between 9 AM and 5 PM Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on (703) 308-5246. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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